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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,152	04/26/2006	Holger Dziallas	034166.006US	9050
25461 7590 10/01/2007 SMITH, GAMBRELL & RUSSELL SUITE 3100, PROMENADE II 1230 PEACHTREE STREET, N.E. ATLANTA, GA 30309-3592			EXAMINER CHUANG, ALEXANDER	
			ART UNIT 1709	PAPER NUMBER
			MAIL DATE 10/01/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/559,152

Applicant(s)

DZIALLAS ET AL.

Examiner

Alexander Chuang

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>5/11/06, 4/26/06, 12/5/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Summary

1. Claims 1-9 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.
3. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed on 12/5/2005.

Specification

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).

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- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 112

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Claim 9 provides for the use of membrane electrode units, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 9 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by KOSEK et al (US 5523177).

KOSEK et al taught a membrane electrode assembly (MEA) comprised of an anode porous electrode structure 11, partially reduced catalyst particles 17 on anode structure 11 and coated with ionomer membrane 12 as stated in claim 1.

Regarding claim 2, KOSEK et al bonded the cathode gas diffusion electrode 18, which is composed of a catalyst layer 13, to the second surface of the ionomer membrane 12. In figure 1, the anode catalyst layer exists between the anode gas diffusion electrode and the membrane. See Figure 1 and column 3; line 63-67 and column 4, line 1-7. The membrane electrode of claim 1 and 2 comprises of the same parts in the same configuration as taught by KOSEK et al.

10. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by ACKER (US 2002/0102451).

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ACKER et al taught a MEA comprised of anode gas diffusion layer 44, anode catalyst layer 42, a proton-conducting membrane electrolyte (ionomer) 80, a cathode catalyst layer 46, and a cathode gas diffusion layer 48. The anode diffusion layer 44 and the anode catalyst layer 42 are in contact with the ionomer 80 on anode side. The cathode catalyst layer 46 and the cathode gas diffusion layer 48 are in contact with the ionomer 80 on the cathode side. Additionally, the ionomer 80 is sandwiched between anode catalyst layer 42 and the cathode catalyst layer 46. See figure 3 and paragraph 46.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claim 3 rejected under 35 U.S.C. 103(a) as being unpatentable over ACKER et al (US 2002/0102451) in further view of MIYAMOTO et al (US 2004/0185414).

ACKER et al discloses a fuel cell system using a DMFC with the same schematic as stated in claim 1; they also discloses the thickness of the anode catalyst layer which is in

the range of 5 microns to 15 microns, however, they did not disclose the thickness of the cathode catalyst layer. Additionally, ACKER et al mentions that it is possible to use other conductive/reactive particles to reduce the level of platinum loading which would reduce the cost of the electrode itself. See paragraph [0051]. MIYAMOTO et al disclose the thickness of anode catalyst layer in the range of 40 to 150 microns. MIYAMOTO et al also stated that the layer thickness is proportional to the methanol concentration: methanol concentration is lower as the thickness is smaller. See paragraph [0061]. Both embodiments are analogous art because both are concerned with the catalyst layers in DMFC. At the time of invention, it would have been obvious to person having ordinary skill in the arts to apply catalyst layers with the thickness consistent of prior art teaching and further adjust the amount to optimize current density.

14. Claim 4, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over of KOSEK et al (US 5523177) in view JÖRISSEN et al (J. Power Sources 105 (2002) 267-273) and SURAMPUDI et al (US 5599638).

KOSEK et al taught a membrane electrode assembly consisting of electrodes and catalyst layers as described above, however, the amount platinum-ruthenium alloy particles in the anode and platinum particles in the cathode catalyst layers are not disclosed. In SURAMPUDI et al's work, loaded platinum-ruthenium alloy particles in the range of $0.5-4.0 \frac{mg}{cm^2}$ in the anode catalyst layer and unsupported platinum particles in the range of $0.5-4.0 \frac{mg}{cm^2}$ in the cathode catalyst layer. Though unsupported platinum was used in the study, SURAMPUDI et al also disclosed the cathode metal particles are preferably

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mounted on a carbon support. See column 7, lines 30-65. Experimental work performed by JÖRISSEN et al shows the current density does not improve when the anode catalyst loading is greater than $2.1 \frac{mg}{cm^2}$. See page 269. All three groups of inventors' works are analogous art since both are concerned with the catalysis of DMFC. It would have been obvious to a person having ordinary skill in the arts to modify the catalyst amounts taught by prior art to optimize current density.

15. Claim 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over KOSEK et al (US 5523177) in view of WILSON (US 5234777).

KOSEK disclosed a MEA for a DMFC as discussed above; however, the method for production the MEA was not disclosed. WILSON disclosed conventional method of fabricating MEA. He synthesize a catalyst ink, applied the ink to the substrate on the electrode, dry it, uniting the components by hot press, and finally boiled the assembly in 0.1 M sulfuric acid and rinsing the assembly with water. See protocol 1 and 2. KOSEK et al and WILSON are analogous art because they are from the same field of endeavor: both works are concentrated in the field of MEA of fuel cell. The present invention requires the catalyst to be applied to the electrode rather than the ionomer. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use a conventional method to adhere the catalyst to the electrode to create a MEA.

16. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over KOSEK et al (US 5523177) in view of PRAKASH et al (US 6444343) and SURAMPUDI et al (US 5599638).

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KOSEK et al taught a MEA for use in a direct methanol fuel cell (DMFC). The operating temperature of his invention was not disclosed. PRAKASH et al discussed DMFC and mentioned the DMFC uses aqueous methanol solution at temperatures as low as 60-90°C. See column 2, lines 12-14. SURAMPUDI et al stated the solid polymer membrane exhibits excellent electrochemical and mechanical stability and high ionic conductivity; these properties allow the DMFC operating temperature to be up to 120°C. Since all the inventors are concerned with the development of DMFC, both inventions are analogous art. Therefore, developing a DMFC with operating temperatures within the range of 60-90°C is obvious to one ordinarily skilled in the arts.

Conclusion

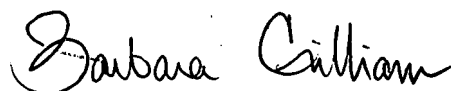
17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Chuang whose telephone number is (571) 270-5122. The examiner can normally be reached on Monday to Thursday 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on (571) 272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AC



BARBARA GILLIAM
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